

REMARKS

In the Office Action dated July 13, 2005, the Examiner rejected claims 1-7 and 9-11 under 35 USC 102 as anticipated by Lin (US Patent No. 6,483,147) and rejected claims 8 and 15-16 under 35 USC 103 as unpatentable over Lin and Mitani (US Publication 2003/0057491). In response thereto, the Applicants have amended claims 1 and 12, added new claim 26, and cancelled claims 2-5 and 17-25. Claims 1, 6-16 and 26 remain at issue.

The Art Rejection

The Examiner has indicated that some of the claims of the present application are anticipated by Lin. The Applicants strongly disagree. Lin does not anticipate any of the claims of the present application.

Lin fails to teach or suggest using a thermally conductive paste such as a DAG in the plug formed in the bulk silicon layer. On the contrary, Lin teaches the use of a number of metals, alloys, nitrides and suicides thereof. Specifically, in column 3, lines 43-49 Lin teaches:

The conductive plugs contain a conductive material that conducts heat, such as a metallic material. The conductive material includes metallic materials such as conductive metals (heat conductive), conductive metal silicides, and conductive metal nitrides. Conductive materials also include non-conductive materials having a conductive substance dispersed therein so that the combined composite conducts.

Furthermore, column 3 line 64 through column 4 line 11 Lin defines the materials to use for the conductive plugs as:

Metallic materials include one or more of aluminum, chromium, cobalt, copper, gold, iridium, iron, lead, molybdenum, nickel, niobium, platinum, palladium, scandium, silver, tantalum, tin, titanium, tungsten, zinc, alloys thereof, nitrides thereof, and suicides thereof. At least one of aluminum, chromium, copper, aluminum-copper alloys, platinum, titanium,

tungsten, and titanium-tungsten alloys are preferred. In another preferred embodiment, the conductive plugs contain a metal nitride or metal silicide barrier layer and a metal or metal alloy core. For example, the conductive plug may comprise a copper core surrounded by a titanium nitride barrier layer, an aluminum core surrounded by a tantalum barrier layer, and an aluminum-copper alloy core surrounded by a titanium nitride barrier layer.

The Lin reference therefore teaches that the thermally conductive plugs can be formed from a plurality of metals, alloys and/or silicides, or a combination thereof.

Lin, however, fails to teach or suggest the use of forming the plugs using a thermally conductive paste such as a DAG. The claims have now been amended to include the heat sink being made from a thermally conductive paste. Mitani fails to teach or suggest anything to do with forming heat sinks in the bulk silicon of a semiconductor device. The claims are therefore not anticipated or obvious in view of the Lin or Mitani references, either separately or in combination.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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